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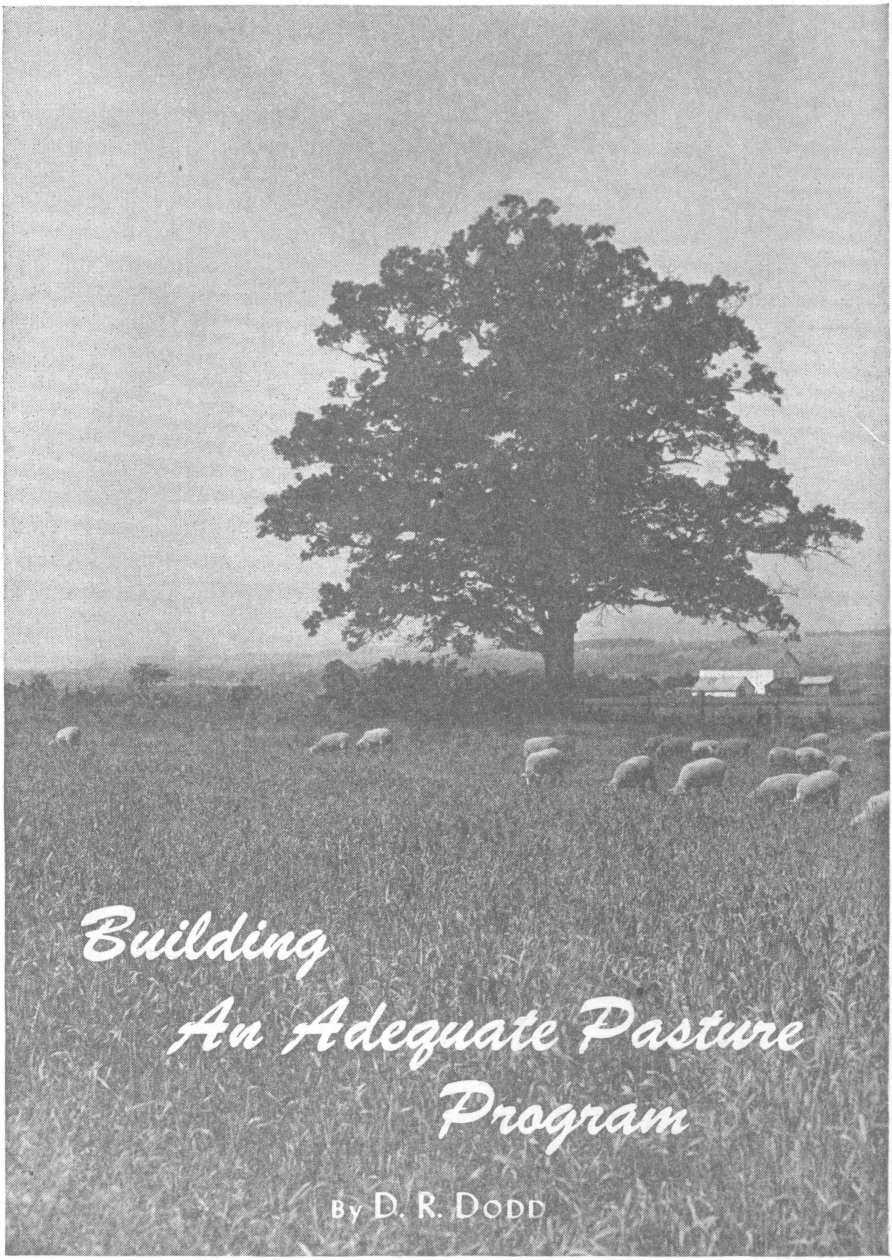

Building An Adequate Pasture Program

By D. R. DODD

Courtesy Ohio Experiment Station

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By D. R. Dodd, *Extension Agronomist*

Why Pasture?

Good pasture is essential to the health of farm animals and generally is the most economical livestock feed. Probably there is no easier or cheaper means of improving the net farm income than by improving the quality and production of the pasture fields, and providing an adequate supply at all times during spring, summer and fall.

What Is an Adequate Pasture Program?

In this discussion of an adequate pasture program, it is assumed that society requires and the farmer desires optimum production and income from the land available. The problem then becomes one of providing such pasture as enables the livestock to produce efficiently and net the greatest income to the farmer. When considered from this point of view, an adequate pasture program is one which provides an abundance of high-quality forage for all the stock at all times during the grazing season. Such an ideal can be attained only by careful planning and timely execution.

Pasture Plants Not Uniform in Growth and Quality of Herbage

Pasture plants are not uniform in rate of growth and quality of herbage throughout the season. Bluegrass is commonly the first pasture grazed in the spring, but it is comparatively unproductive in midsummer. Red clover and timothy in rotation pastures supply grazing a little later in the spring, but they decline less in production in midsummer than bluegrass pasture. Ladino clover is an abundant producer during most of the season but it is retarded greatly by continued hot, dry weather in July and August.

Even alfalfa, a comparatively good grower in midsummer, makes about half its total season's growth in the first third of the season. This means that the same acreage would carry only half as much livestock in midsummer and early fall as it would during the earlier part of the season. Sudan grass, on the other hand, is a hot weather annual. It produces nothing in the early part of the season but grows rapidly in midsummer. Just as there is

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variation in rate of growth so there is variation in quality. If the best quality is to be obtained, pasture herbage should be grazed at or near the time of its best growth.

Pasture Growth and Livestock Requirements Compared

During an average year, improved bluegrass pasture produces somewhat after the manner of the upper wavy line in Figure 1. Livestock, on the other hand, require a more or less uniform feed supply as indicated by

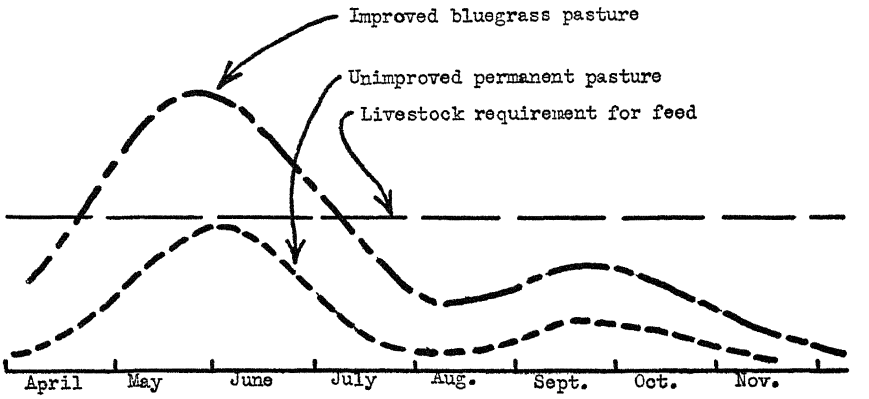

Fig. 1.—Illustrating the rate of growth of two types of pasture from month to month with the constant feed requirements of livestock.

the straight line. Unimproved permanent pasture, as indicated by the lower wavy line in Figure 1, seldom produces enough at any time to meet the requirements of the stock a good farmer would want to carry. The average rotation or meadow crop pasture has a production curve somewhat like the improved bluegrass but does not dip as low in midsummer. The problem is to build a pasture program that provides grazing in accordance with the requirements of the livestock desired. If this is not possible the livestock load should be adjusted to the pasture or other feed that can be provided. Frequently profits from livestock are more limited by insufficient feed than by the number of animals kept.

Building a Pasture Program

The successful solution of this problem depends upon the ability to select and fit together in a program the crops and practices necessary to provide the required pasture. The following suggestions have been prepared to assist those interested in determining what pasture crops, acreages and production and utilization practices can best be combined under their individual conditions.

Pasture Requirements of Livestock

Animal units of different kinds of livestock naturally do not take the same amount of pasture. Cows, for example, take much more pasture proportionately than hogs.

In Table 1 is given the number of animals of various kinds that may be expected to consume approximately the same amount of pasture. From those relative numbers may be figured the total pasture requirements in terms of animal unit grazing days of all the animals on the farm for each month of the grazing season. It is recognized, however, that a particular type of pasture is not equally satisfactory for all kinds of livestock. That fact must be considered; also the desirability of separating different kinds of stock and providing separate areas for that purpose. For example, frequently special areas are set aside for the exclusive use of hogs or poultry, even though such areas may be shifted from place to place, one year to another, or even within the same year.

TABLE 1.—Animal unit equivalents in daily pasture consumption. That is, number of animals of various kinds that will consume as much pasture as one cow, in one day. (Approximate.)

Kinds of Livestock	*No. of Animals*	*Kinds of Livestock*	*No. of Animals*
Dairy cows	1.0	Ewes with lambs to weaning (fine wools)	6
Dairy heifers	2.0	Ewes with lambs to weaning (coarse wools)	5
Beef cows	1.0	Lambs after weaning	12
Beef steers and heifers	2.0	Sows at 300 lbs.	5
Horses and mules	1.0	Pigs at 50 lbs.	50
Colts	2.0		
Hogs at 150 lbs.	16		

Production from Different Kinds of Pasture

In Table 2 are given the number of days of animal unit grazing per month that one acre of different kinds of pasture might, *on the average*, be expected to supply. From this may be figured the acreage of various kinds of pasture that must be provided from month to month in order to provide adequately for all the livestock on hand or anticipated.

When applying these figures to individual farms, consideration should be given to the fact that some farms produce half and others double the average yields. The required acreages should be adjusted accordingly.

Fitting Pastures to Livestock Requirements

As an illustration of how these tables may be used, let us assume a farm with certain livestock and pasture conditions and then attempt to bring them into balance. Our assumption on livestock with the animal unit grazing days required as calculated from Table 1 is given in Table 3. In calculating the required grazing days, allowance should be made for variation in animal unit equivalents from month to month due to normal increases in numbers and growth and sales at appropriate times of the various kinds of stock. This has been done in arriving at the figures given in Table 3, as is evident from the irregularities in the figures in the lines following the various kinds of stock.

TABLE 2.—Pasture crops with time of production, animal unit grazing days[1] per month per acre furnished by each, and the usual acreage required per animal unit equivalent at different seasons of the year. The solid line indicates dependable production. The broken portion indicates doubtful producton.

Crop	Time of Grazing and Animal Unit Grazing Days per Acre by Months								Usual acreage required per animal unit as listed in Table 1
	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	
Untreated permanent pasture		12	14	5	2	5	5	2	2½ spring; 5 fall
Treated permanent pasture (LP)	6	24	26	10	5	10	10	4	1¼ spring; 3 fall
Treated permanent pasture (L(60N)PK)	20	44	34	10	5	11	11	4	¾ spring; 3 fall
Rotation pasture old timothy)		15	18	7	2	7	7	3	2 spring; 4 fall
Rotation pasture (clo-tim)[2,3]	3	32	34	16	10	14	10	3	1 spring; 3 fall
Rotation pasture (clo-tim) after June hay[2,3]				8	16	12	8	3	2½ midsummer
New meadow seedings[2,3]					7	7			3 to 4 for short periods
Ladino clover	5	30	30	16	6	18	12		1 spring; 2 fall
Alfalfa-clover-grass mixture, no hay removed[2,3]	3	34	40	25	15	20	12	4	¾ spring; 2 fall
Alfalfa-clover-grass mixture after June hay[2,3]				15	20	20	12	4	1½ midsummer to fall
Sudan grass				20	38	30	10		1 midsummer
Korean lespedeza, in grain					15	15	6		2 southern Ohio
Early sown winter barley or rye	12	25	5				8	8	1¼ spring; 3 fall
Wheat and rye fly free date seeding	12	25	10						1¼ spring short period
Rape		25	25	10	8	8	15	5	1½ early, 3 later
Sweet clover	8	25	25	17	4	4	10		1 2nd yr., 3 1st yr.

[1] An animal unit grazing day is the pasture requirement of 1 cow for 1 day, 16 pounds T.D.N.

[2] It is not safe to do much pasturing on new seedings or old alfalfa and clover mixtures after September 15 if they are to be used for hay or pasture the next year. The late grazing indicated in this table is intended only where the meadow is to be broken the following spring.

[3] The inclusion of Ladino clover in the mixtures has little effect on hay yields but may be expected to increase the animal unit grazing days by about 20 per cent. Brome grass and orchard grass do not give greater production than timothy in the course of a year, but they are more persistent and produce more in July and August.

TABLE 3.—Animal unit grazing days required by months for the assumed livestock indicated in Column 1, for a grazing season from April 21 to November 1.

Kind of livestock and number	Animal unit equivalents at beginning of season	Animal Unit Pasture Days Needed						
		April	May	June	July	Aug	Sept.	Oct.
10 cows	10 0	100	310	300	295*	310	300	310
8 head young stock.	4 0	40	124	136	103*	115	122	132
2 horses	2.0	20	62	60	62	62	60	62
25 ewes with lambs (c.w.)	5	50	155	160	175*	140*	145	155
2 sows and pigs....	0.4	4	14	20	30	44	30	12
Total.....	21.4	214	665	676	665	671	655	671

* Some stock sold

For pasture on this imaginary farm, let us first assume 25 acres of permanent pasture adequately treated with lime, phosphate and potash, and 20 acres of alfalfa-grass available for midsummer grazing after the removal of an early June hay crop. By multiplying these acreages by the values for each month indicated for them in Table 2, we can see how many animal unit grazing days for which pasture would be available. From these values it is obvious that our pasture is not adequate for this assumed livestock load during any portion of the grazing season. Since the values given in Table 2 are rather conservative, it would be possible by liberal treatment and good management to raise these yields, but, for this illustration, we shall stick with these assumed average production rates.

Correcting Deficiences

Since nitrogen-treated permanent pasture gives a greater production early in the season as indicated in Table 2, we shall try applying 60 pounds of nitrogen per acre to 5 acres of the 25 above mentioned. To help out later, we shall try 5 acres of sudan grass. However, if one could start the planning a year rather than just a few months in advance of our needs, additional acres of alfalfa-ladino-grass probably would be better, cheaper and less damaging to the soil. The total animal unit grazing days that might be obtained from all of these pastures is limited by months in Table 4.

TABLE 4.—Kinds of pasture planned for and the animal unit grazing days by months they would provide.

Kind of pasture and acreage	Animal Unit Grazing Days by Months						
	April	May	June	July	Aug.	Sept.	Oct.
Limed and mineral treated permanent pasture. 20A.....	120	480	520	200	100	200	200
L.N.P.K. treated permanent pasture. 5A.	100	220	170	50	25	55	55
Alfalfa-grass after hay. 20A.....	0	0	0	300	400	400	240
Sudan grass. 5A.....	0	0	0	100	190	150	50
Total.....	220	700	690	650	715	805	545
Livestock requirements from Table 3	214	665	676	665	671	655	671

By comparing the pasture days available in Table 4 with the requirements of Table 3, and as also indicated at the bottom of Table 4, it is evident that we now have a fairly good balance. There are shortages in July and October. The July shortage is small and can easily be overcome by seeding the sudan grass about the middle of May instead of the customary first of June. The October difficulty will be largely overcome by a carry-over of pasture from September. Any remaining deficiency may be provided for by more barn feeding, by an early fall seeding of 5 acres of winter barley or rye, or by the early fall use of nitrogen on a portion of the permanent pasture land.

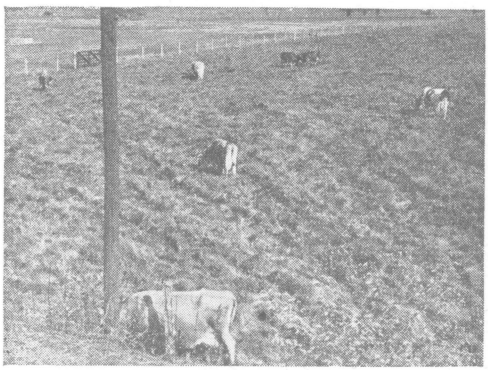

Fig. 2.—Nitrogen treated grass provides extra early spring grazing. Cows on pasture April 25 Columbus.

In this illustration, sudan grass, as an emergency pasture, has been assumed to be necessary in addition to the alfalfa mixture for midsummer grazing. It is recommended only in emergencies.

Where the land available is not adequate to provide for the livestock regardless of crops grown and the treatment and management of the pastures, the livestock must be adjusted to the capacity of the land. Livestock profits soon disappear when pastures or other economic feed supplies are inadequate.

Good Meadows and Pastures Necessary

From the foregoing discussion, it is evident that a satisfactory farm pasture program depends upon better rotation and permanent pastures than we now generally have. Means for the improvement of rotation pastures are considered in the following paragraphs. Those for the improvement of permanent pastures are presented in Ohio Agricultural Extension Service Bulletin No. 283, entitled "The Improvement and Management of Permanent Pasture."

Improvement of Rotation Pastures

There are three means by which marked improvement in the production of rotation pastures may be accomplished. These are (1) adequate lime and fertilizer treatment, (2) the seeding of more appropriate seed mixtures, and (3) better management. Since the rotation pastures are regular crops in the rotation and are also frequently used for hay, suggestions for their improvement are in part a modification of hay crop seeding practices.

Lime. Lime in such amount as is needed should be applied as soon as possible. This may be done any time on sod or on plowed land; on sod is the easiest and most economical place.

Fertilization at Time of Establishment. Generally the rate of fertilizer application commonly used in connection with the establishment of the rotation pasture should be doubled unless this brings the total rate per acre above 450 pounds, where the sod is to be held two years, or 300 pounds where it is to be held one year. The fertilizer may vary with soil types and other factors but usually a 3–12–12 or a 4–12–8 is preferable. More detailed suggestions can be found in the Agricultural Extension Service fertilizer recommendation bulletin issued annually.

Fertilization of Established Sods. Where rotation pastures are retained for two or more years, additional fertilizer applications are desirable. Where the sod contains a high legume content, this should consist of 400 pounds of 0–12–12, 0–10–20, or 5 to 8 tons of manure supplemented with 200 to 300 pounds of 20 per cent superphosphate per acre, before the second hay year and every other year thereafter. Where the sod is largely grass, such as timothy or brome grass, nitrogen in addition to the minerals used as directed above, should be applied annually in the fall or early spring at the rate of 50 pounds or more per acre. This is the equivalent of a minimum of 250 pounds of sulfate of ammonia or 150 pounds of ammonium nitrate. A heavy application of fresh rich manure may replace the nitrogen fertilizer. This is an excellent means also of producing extra early pasture.

Seeding Mixtures. Seed of plants capable of maximum pasture production should be used at the time of establishing the rotation pasture. On

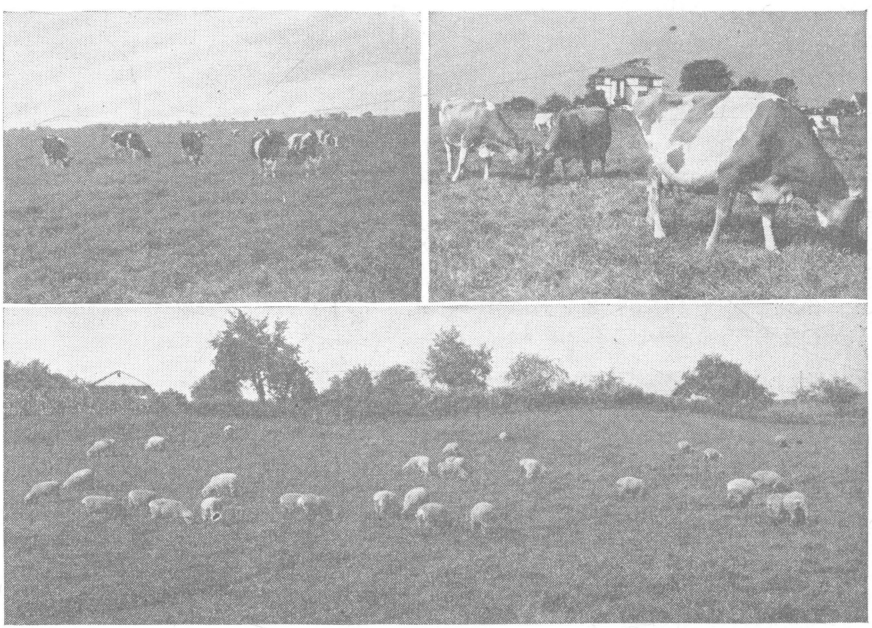

Fig. 3.—May and June pasture may be of the alfalfa-clover-timothy type (left above) or the permanent pasture type. (Right top and bottom.)

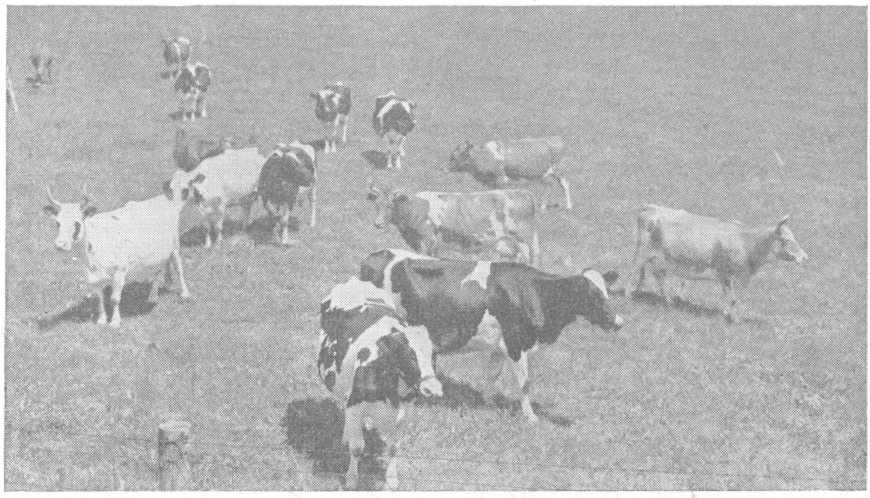

Fig. 4.—Additional pasture must be provided for midsummer. Cows are registering their dissatisfaction with a bluegrass pasture that has ceased to grow in dry midsummer.

farms specializing in livestock raising it is usually desirable to hold rotation or hay type sods two or more years.

Where the sod is to be held for one or more full years following the seeding year, 1 pound of Ladino clover should be added to or used to replace a part of the other legumes in any good hay mixture suited to soil conditions. The inclusion of the Ladino will greatly enhance the pasture production possibilities of the mixture. One good mixture consists of alfalfa, 6 pounds; red clover, 3 pounds; and Ladino clover, 1 pound; all seeded in the spring, and 3 pounds of timothy seeded in the fall or 6 pounds in the spring.

Where the sod is to be held for two or more years, 5 to 8 pounds of brome grass may be used in place of part or all of the timothy or other grass in the regular hay mixture. Brome grass seed should be covered very shallow. It may be mixed with 100 to 300 pounds of fertilizer and drilled from the fertilizer hopper in the early fall, either on land where an early fall grain has been seeded or alone. Another way is to mix it with 6 pecks of oats or with fertilizer and seed very shallow in the spring. Eight to ten pounds of alfalfa, 1 pound of Ladino clover and 7 pounds of brome grass make an excellent long-lived combination. Brome is more palatable than orchard grass and yields better in midsummer than timothy.

In the southern third of the state, in situations where success with alfalfa and red clover is doubtful, 15 pounds of Korean lespedeza and 8 pounds of orchard grass make a good pasture.

Where the pasture is in a short rotation and will be used only to a limited degree, following grain harvest, and to capacity during the early part of the following year, sweet clover alone, at the rate of 10 to 12 pounds per acre, or in combination with 4 to 6 pounds of orchard grass, is very

good. The orchard grass is best seeded in the spring at the same time as the sweet clover. (See Ohio Agricultural Extension Service Bulletin No. 261, "Meadow and Pasture Seedings" for more detailed suggestions and other seed mixtures.)

Grazing. Grazing should be to capacity but not overdone. Herbage unconsumed produces neither meat nor milk. Generally the younger the plant or the newer the growth, the richer it is in nutrient content, but on the other hand, the younger it is when grazed or cut, the slower will it recover and the lower will be the total yield.

Fig. 5.—An alfalfa-ladino clover-grass combination is probably the best midsummer pasture.

The larger hay type plants, such as alfalfa and timothy, will not stand the close grazing used with bluegrass and white clover. A growth of 6 or more inches in hay type pastures is desired where continuous grazing is practiced. Four inches is the lower limit where rotation grazing is practiced.

Mowing. Mowing of rotation pastures in order to save the surplus growth for hay or silage is good practice. There are times also when the mowing of a surplus and matured growth is desirable to encourage the development of a more palatable herbage. Such mowing, when needed, should come at about the time that a hay crop would normally be removed. Mowing at the beginning of or during a dry period serves only to reduce the herbage available and retard future growth. By mowing only a portion of the pasture at one time, the possibility of an inadequate pasture supply occasioned by unfavorable growing weather and a slow comeback may be overcome. Both mowing and rotational grazing are means to an end and not ends in themselves. They should be used only when and if needed and not with calendar regularity.

Emergency Pasture Crops

Sudan grass is a vigorous growing annual that makes its maximum growth in July, August and September. It is palatable and readily eaten by dairy cattle, beef cattle and sheep.

Culture. Seedings are usually made on a well-prepared firm seedbed between May 20 and June 10, but later seedings may be made up to July 15. The seed should be covered not more than ½ inch. Cultipacking before and after seeding is helpful.

The recommended rate of seeding is 20 to 30 pounds per acre, which

will usually result from drilling from the wheat side of the grain drill set at the 2-peck rate. In case the drill will not sow this small amount the seed may be diluted with cracked corn.

Sudan grass should be grown on productive soil, and although some cases of poor fertilizer response have been observed, yield increases of 50 per cent or more have resulted in others. The crop is very responsive to nitrogen and where a shortage of this element is suspected 500 pounds per acre of a fertilizer, such as 8–8–8, is recommended when seeding.

Pasturing Sudan Grass. In six weeks, with a favorable growing season, sudan grass will be 12 to 15 inches high and ready to graze. It should not

Fig. 6.—Sudan grass is our best emergency midsummer pasture.

be grazed before it has reached this height since young sudan has been known to carry sufficient cyanide to be poisonous.

It is suggested that livestock be observed for an hour when first turned into sudan. Unless the animals are very hungry they are likely to stop eating and look for other pasture in a little while, if there is sufficient cyanide present to be dangerous. For this reason it is suggested that the gate to another type of pasture be left open so the animals may come and go as they choose.

It is well to have two fields or divide one by an electric fence so as to permit one to grow while the other is being grazed.

Ladino Clover, in addition to its use in a mixture with alfalfa and grass, is sometimes used alone as a special pasture for poultry, hogs and sheep. Used in this manner, it has about the same carrying capacity as indicated for an alfalfa mixture, but is less productive in midsummer or in dry periods. It is very palatable and persists longer under grazing conditions than alfalfa. It may be sown with or without a companion crop in early spring at a rate of 2 or 3 pounds per acre. It should be fertilized liberally with an 0–12–12, 0–20–20 or 3–12–12 fertilizer, and the application repeated every one or two years. An 0–10–20 might be used for this top-dressing on established stands.

Dwarf Essex rape is another crop frequently sown as a special pasture for sheep and hogs. Rape requires a productive soil and responds well to lime and fertilizer. An application of 300 to 500 pounds per acre of a 4–12–8 is recommended. When the seed is sown broadcast or from the grass seed hopper of the grain drill 5 to 8 pounds of seed is required. If sown in 24-inch rows 3 pounds of seed is sufficient. This permits cultivation for weed control. For early spring seedings, the drilled rate may be reduced to 3 to 5 pounds with 1 bushel of oats drilled at the same time.

The small grains when seeded exclusively for pasture may be seeded at a heavier rate than is common when these crops are sown for grain. In the case of poultry, this may be as much as 3 or 4 bushels per acre. New meadow seedings made in small grains are more likely to succeeed where the grain crop is pastured off rather than left for grain. However, rye and barley may be sown early in the fall, pastured in the fall and again in April and then make a grain crop. Wheat may be used in the same manner but due to fly damage, it is not sown usually before the fly safe date and is used for spring pasture only. Spring oats, on the other hand, provides pasture only in May and June.

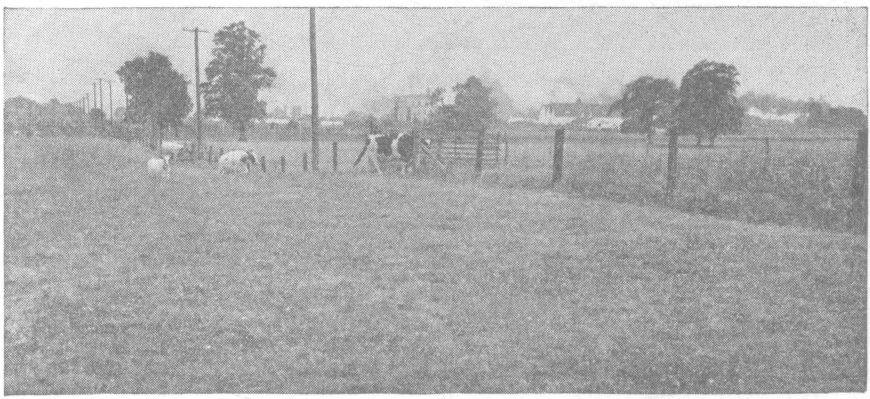

Fig. 7.—The open gate system for midsummer grazing. Cows graze in sudan grass at the right or blue-grass-white clover at the left, as they choose.